



# **Biological Warfare Defense and Biological Systems**

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# BWD is *Very* High Priority

## *Why?*

- **Protect military troops, airfields, ports, depots**
- **Prevent, mitigate terrorism against population centers**
- **Bioengineering technology may lead to new pathogens**



# Biological Primer

*Bacteria, Viruses, Toxins are quite different*

- **Size of agent particle**
- **Modes of action in the body**
- **Effects can be lethal to incapacitating**
- **Time for symptoms to appear**
- **Size of dose needed for disease or death**



# Bioengineering Problem

- **Antibiotic resistant (bacteria)**
- **Disguised pathogens**
- **Non-pathogens turned into pathogens**
- **Enhanced infectivity**
- **Enhanced stability in environment**
- **Changed route of infectivity**
- **Increased production yield (toxins)**

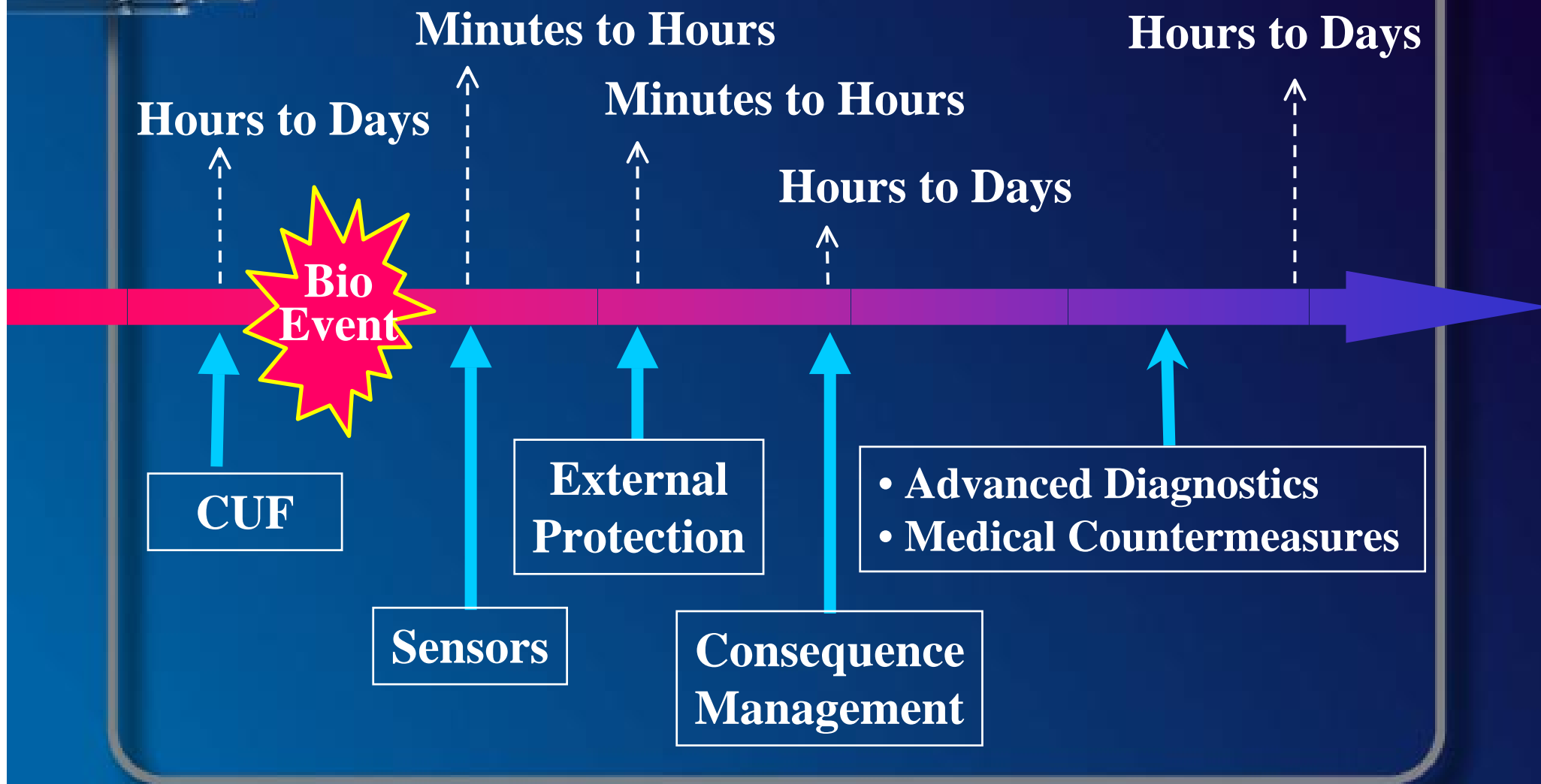


# **BWD at DARPA**

*Goal:*      **Thwart the use of biological warfare agents (including bacterial, viral, and bioengineered organisms and toxins) by both military and terrorist opponents**



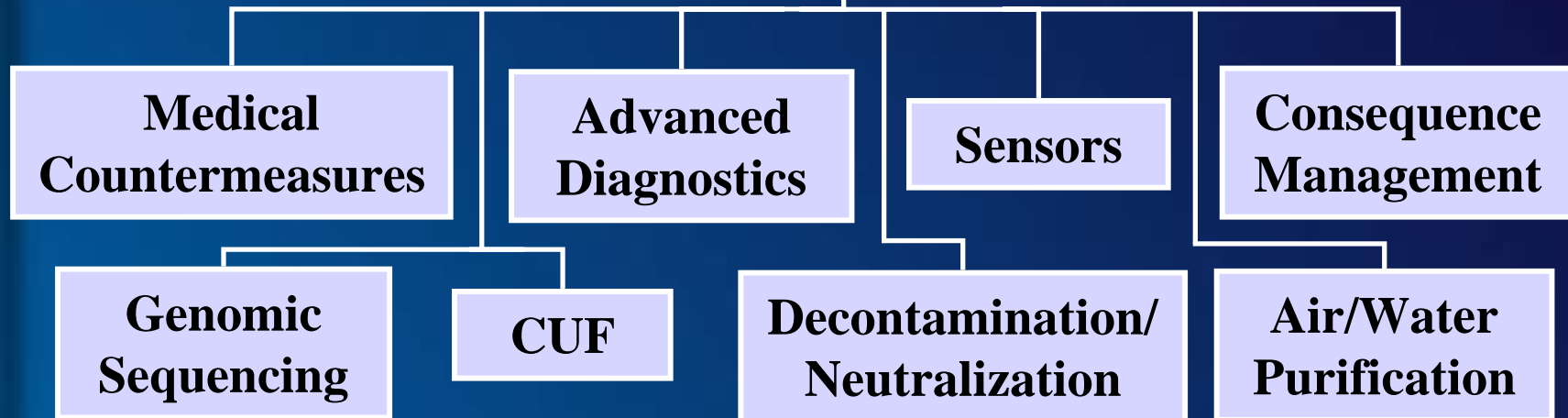
# BWD Program Overview





# BWD at DARPA

## *DARPA BWD Program*





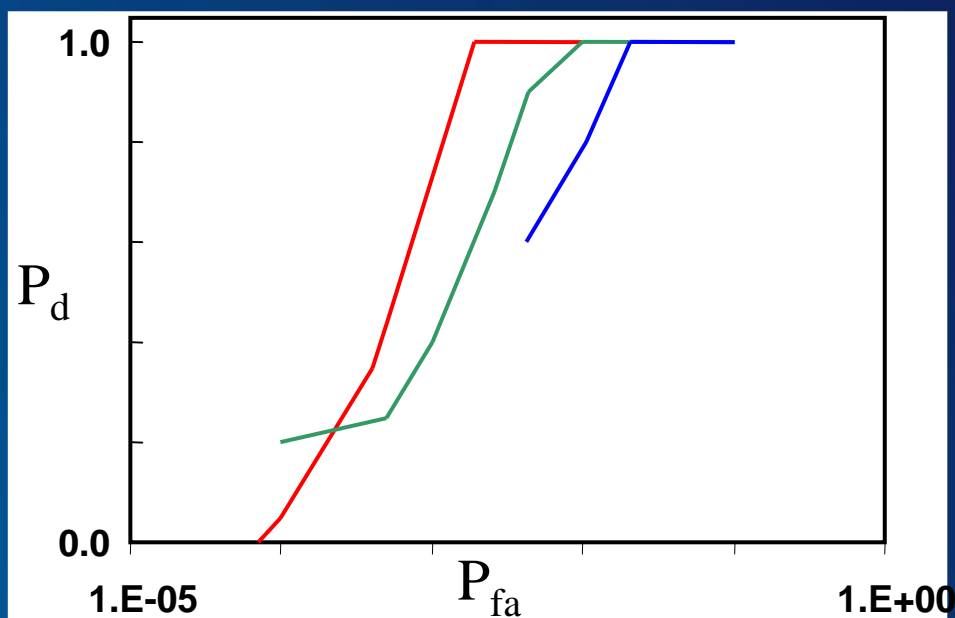
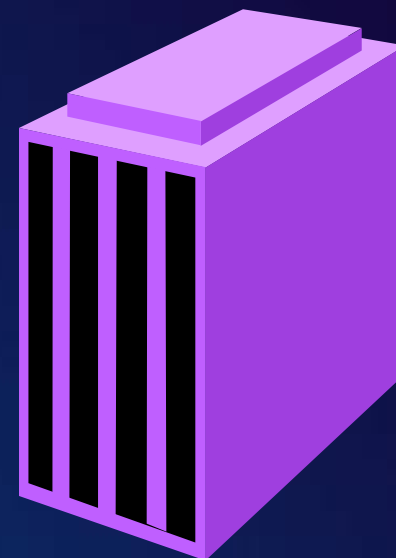
# Biosensor Objective

- **Fieldable (Small, Low-Cost)**
- **Integrated**
- **Live vs Dead**
- **Unattended**





# BWD Systems





# **Operational Impact of Information Management**

## **The Information Problem:**

- **Managing consequences of a terrorist attack is very complex**
- **What to do is not well known - hard to find the “few who know”**



# ENCOMPASS Components



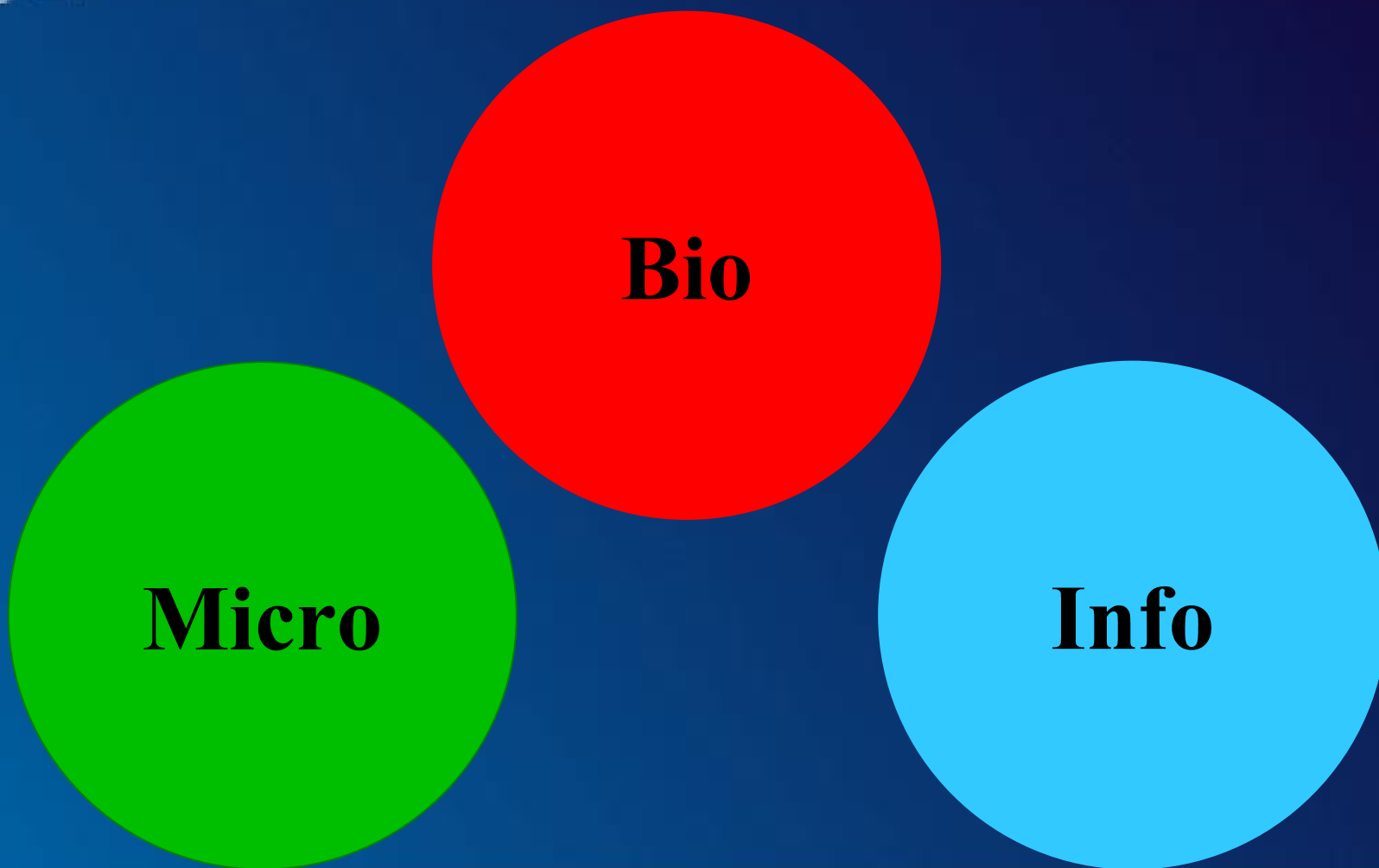


# ENCOMPASS Components

- **Electronic PlayBooks**
- **Incident “Repository”**
- **Electronic Watchboard**
- **Patient/Casualty Tracking**
- **ViewPort**
- **CODA/BASIS**
- **Casualty Management**

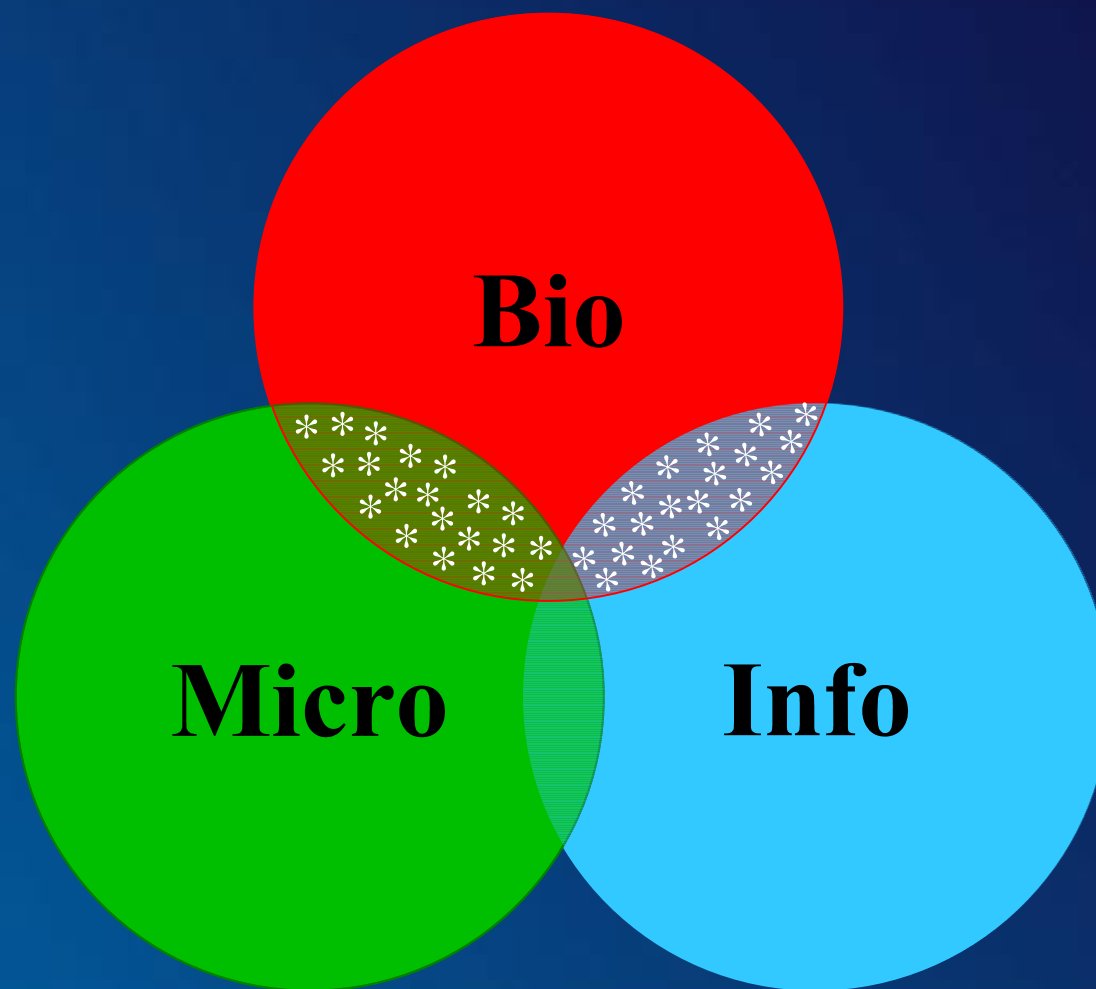


# **[Bio:Info:Micro] Interface**





# Interface of Biology With More Conventional DoD Technology





# Controlled Bio Systems

**Control, influence, or mimic the locomotion and distribution of biological organisms for sensing, reporting and countermeasure delivery**

**Biotic Control**

**Control through  
Biointerfaces**

**Biomimetics**





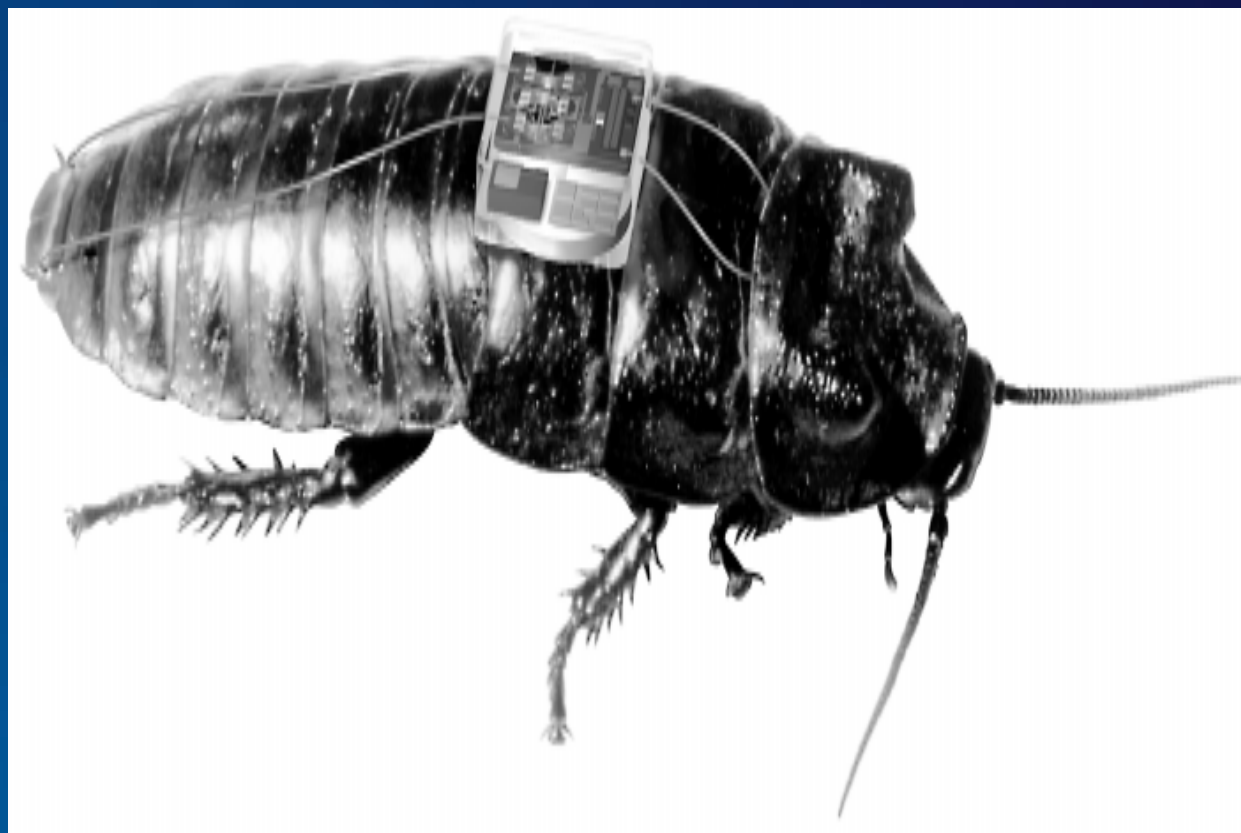
# Biotic Control





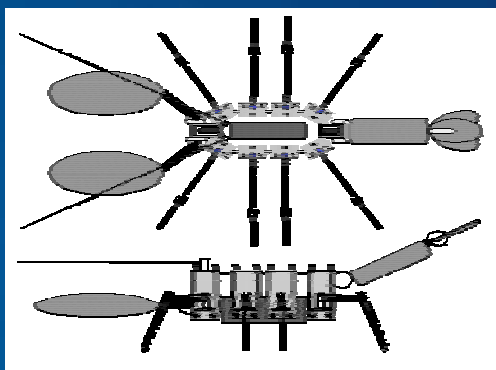
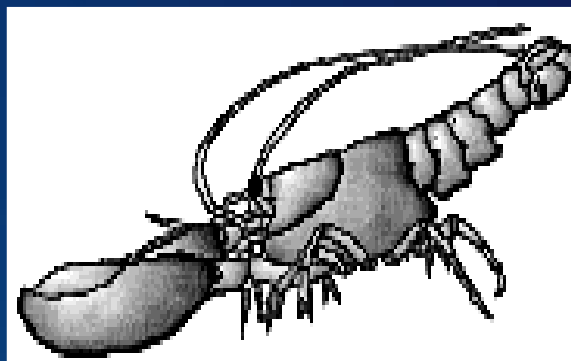


# Control through Biointerfaces





# Biomimetics





# Electronic Dog's Nose

